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MANAGEMENT ORIENTED MICRO SYSTEMS

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MANAGEMENT ORIENTED MICRO SYSTEMS

A Transcript of Comments Presented to the
1967 University of Illinois Paul D. Converse Awards Symposium

by

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The papers presented by this morning's speakers have raised three related questions in my mind. In the hope that these thoughts may provide useful input to later discussion, I would like to share them with you. Taking advantage of my role as discussant I would also like to make some preliminary comments with reference to these topics.

The three questions which I propose that we consider are:

1. What is the appropriate focus of micro system development?
2. What are the defining attributes of a micro system?
3. How are micro systems to be integrated into larger macro systems?

The first question relates to criteria applied in choosing between alternative micro system structures. Are we in the position to identify key attributes of successful or efficient system development? Can we agree on specific goals to be achieved through micro system development? Faced with a staggering number of potential micro systems, how do we establish priorities? Can we devise criteria to be applied in allocating resources among the numerous alternatives?

My second question reveals a growing suspicion that one man's system is another's tautology. We frequently fail to establish even the most rudimentary characteristics of the "systems" with which we are concerned. Are they open or closed systems? Static or dynamic? Rigid or adaptive? Stable or unstable? Most classical systems analysis has focused on feedback mechanisms and yet we

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have heard little of this concept this morning.

What do we mean to communicate with the word "system"? Are we using it to describe a particular conceptual framework? Or, are we less concerned with structure than with function? If it is a "systems approach" with which we are enamored, perhaps more emphasis should be placed on methodology and the specifics of procedure.

We do seem to agree that our micro systems are to be "management oriented". This would imply management/micro system interaction. And yet we have said little about management/system linkages or the nature of expected micro system contributions to the management process.

My third question is prompted by the frequent intimations that micro systems are not ends in themselves. We are apparently confident that micro systems (which are, I take it, smaller than "macro" systems) can be synergistically combined in macro systems which will benefit markedly from a micro heritage.

How is this integration to be achieved? What is to be the integrating mechanism?

I. THE FOCUS OF MICRO SYSTEM DEVELOPMENT

Our speakers this morning have offered conflicting answers to my first question.

Qualitative Description versus Quantitative Formulation

Should micro system development focus on qualitative description, quantitative formulation, or both? All three approaches have been suggested. Can clearly drawn word pictures define a system or are explicit logical or mathematical expressions prerequisites of systems analysis? Both points of view have been expressed.

Phil Kotler believes that "variables found in marketing processes do not generally exhibit the neat quantitative properties found in production and financial processes".

Ed Weber, on the other hand, notes that "strategic factors and decision rules included in ... (his) ... study fall into three different groups (1) those conceptualized and articulated explicitly; (2) those inferred from interviews and records; and (3) those beliefs and judgments which were inferred from interviews but could not be translated into specific surrogates.

There have been several questions relating to whether or how much to quantify. I don't believe we have an option. In my opinion, explication is an absolute prerequisite of systematic structure. Word pictures have much in common with their graphic counterparts in Optical art. It is all but impossible to maintain a definitive perspective with respect to them. The popularity of qualitative models may be in large part attributable to their illusive form. The verbal model builder certainly enjoys a substantial advantage in discussions with his quantitative colleagues. When faced with objections he can reply in the manner of Humpty Dumpty "... in rather a scornful tone, when I use a word, it means just what I choose it to mean -- neither more nor less."[1]

Explication fosters disagreement. I would, in fact, suggest that a model with which no one disagrees is very apt to be either ambiguous or tautological. The product of micro system development should be testable assertions -- models which may be explicitly validated or rejected.

Assuming we agree on the desirability of quantification, a further question must be raised. Who is to do the quantifying? Should micro system

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[1] Lewis Carroll, Alice Through the Looking Glass (Duell, Sloan, and Pearce, New York), Chapter 6

development focus (1) on the processes followed by existing decision makers, or (2) on the environment which these decision makers attempt to influence.

A Focus on Decision Makers

Phil Kotler suggests that decision makers are the appropriate focus of micro system development. "Decisions serve as a construct around which many separate management processes can be integrated."

Despite the popularity of this orientation, it is recognized that existing decision procedures are far from ideal. Weber attests to this fact with his comments that "although the problem can be formulated to yield an infinite number of estimates to be compared on the basis of their likelihood of occurrence and their consequences, it is important to emphasize that this was not how the buyers defined their planning problem. The problem for them was not to select but to find an appropriate solution. It was a process of constructing a solution which was acceptable and which was automatically accepted."

Martin Starr similarly notes that "the classical production orientation is hardly one to encourage either variety or diversity. Production is stuck with old product design and process concepts. It has not moved with any sense of conviction to participate in the critical product planning process."

If existing behavior is sub optimal, non systematic, irrational, or just plain confused, why model it? Are not normative decision models a more productive focus for micro system development?

Normative Decision Models

Phil Kotler has taken a rather dim view of normative models. He alleges that they "... lack relatedness to the decision environment of specific marketing executives in the firm," and complains, not without cause, that normative models are too often "developed without a sense of their

organizational locus."

Phil is particularly concerned with the practical use of normative models. He speaks with feeling of the frustrating realization that once management has acted on the basis of a particular normative model neither management nor the researcher will ever know what would have happened if a different decision had been implemented. Simulation is proposed as a way out of this dilemma. Normative models would be validated by examining the outcomes realized through simulated application of alternative formulations. There is one difficulty associated with this proposal. It raises some nasty meta-modeling problems. We must now worry about validating the validation procedure -- we must validate the environmental simulation used to validate the normative decision model. Thus an initial focus on decision processes must be reoriented toward models of the decision environment.

Goals as a Focus

Ed Weber proposed that micro systems might be used to determine whether goals are "set 'on high' first and then executed by subordinates, or do subordinates adjust and modify goals in implementing higher management's directives?"

Models which attempt to describe management behavior as goal seeking may be deceptive. The successful manager has usually learned to set "realistic goals". That is to say, goals which he is confident of meeting. It is difficult to describe or evaluate behavior in terms of such goals. In this context I am reminded of a recent dinner conversation with a friend who is the Chief Executive Officer of a corporation well known for its financial strength and goal of "X% before taxes". Noting that his year end P & L exuded the usual robust glow, I asked about the impact of a $12 million write-off associated with an abortive new product activity with which we were

both familiar. His succinct response was delivered with a smile. "I have a slush fund."

The model builder who chooses to focus on management goals must assume that they determine or measurably influence decision processes. In many instances this assumption is not valid. Goals are frequently relevant only in retrospect. They merely determine the language of rationalization.

A Focus on Executive Responsibility

Phil Kotler has proposed that emphasis be placed on "research designed to identify the specific decision responsibilities of different marketing executives." I strongly support this proposal but suggest that we go further. Once an executive's decision responsibility has been classified we should focus on his models of the market environment. We should challenge the executive to describe the processes which he is attempting to influence. There is an important distinction between decisions and models of the environment influenced by decisions. It is useless to look at a manager's decisions without first understanding his perception of the decision environment.

Once explicit, decision oriented, models have been formulated they must be tested and validated or rejected. Micro system development should be an interactive process through which management and researcher work to refine and validate explicit models of those marketing processes which are of concern to the executive. Models shared by the executive and researcher can be used to integrate existing data and identify new or revised data requirements.

Micro system development appropriately begins with management models. However, it must not stop with the initial formulations. Management's intuition and insight are the basis for a preliminary and qualitative

sensitivity analysis. While incipient models may be limited by existing procedures and prejudice, they establish a management perspective and insure that subsequent analysis focuses on actionable market processes.

A Proposed Focus for Micro System Development

I would suggest that micro system development should focus on market processes rather than existing decision procedures. It should be concerned with the impact of management controlled variables on trade channels and consumer or industrial purchasers. The objective of such development should be to model, refine, and validate management understanding of market interactions and to relate relevant measures of behavior and response to management action alternatives.

II. STRUCTURAL ATTRIBUTES OF MICRO SYSTEM

My second question might be more simply stated, What kind of micro systems are we attempting to develop?

Generalized Micro Systems

Many comments this morning indicate a concern for generalized or generalizable micro systems. Kotler addresses this point when noting that "the aim ... (of his research) ... is to characterize how a 'typical' product manager might think through a particular problem facing product managers, and not to get at individual variations."

Weber asserts that "one would expect that strategic factors considered by any decision maker would tend to be similar when faced with similar decision situations."

I wonder if we may not be too concerned with generalization. Is generalization really desirable? Is it realistic, for example, to attempt to support both research and management functions with the same system? Research goals are largely inductive. The researcher strives to generalize to broad

applicability from a limited sample. Management, on the other hand, is concerned with models and data applicable to a specific decision. The manager's use of micro systems is deductive -- narrowly focused on a particular problem.

In a broader sense, is it realistic to think in terms of generalized management systems applicable to all companies? I think not. Each company's management has unique requirements; a unique perspective on the environment within and outside of their firm; unique priorities; and a style of management which is the unique product of the particular personalities making up their management group. Common micro sector models will undoubtedly appear in many systems since several companies will be concerned with the same or comparable markets. However, the interfaces linking these models to management will reflect each management's priorities and perspective.

The Need for a Limited Focus

Phil Kotler has pointed out that systems must be limited; that no system "can include everything and still be useful." I would also suggest that management priorities should determine that which is to be included in the system. It is easier to obtain funding for research which management considers relevant and managers will use a system which contributes to the solution of problems of concern. Not surprisingly, management shows little interest in systems, however sophisticated, which do not impact on relevant decision areas.

Open Versus Closed Systems

The Micro systems discussed this morning are based on open- as opposed to closed-loop structures. They are designed to respond to inputs from management and other market elements and to provide outputs to these elements. The design of interfaces linking these models to remaining marketing system sectors is therefore of prime importance.

It is possible to develop closed macro systems made up of interactive micro sectors representing management and competitive actions, market responses, and management reactions. Systems of this type are being used to simulate competitive market interactions and to evaluate policies and strategies under assumed conditions.[2]

Such systems permit us to examine feedback based response characteristics of the type discussed by Jay Forrester earlier in this symposium.[3] Comments this morning have hinted at the extension of such structures to achieve adaptive management control systems -- systems that "learn", that modify their structure in response to changes in the decision environment. It is possible to create such systems in which models adapt to the changing market environment. I would suggest, however, that changes in system structure should be effected by management rather than by a computer. A system may be designed to alert management to changing conditions and alternative models. However, just as management understanding is a prerequisite of successful system development, management evaluation and understanding must precede changes in model structure. Management must not suddenly discover that models with which they are familiar have been unilaterally modified by an adaptive system without their knowledge or consent.

III. MICRO SYSTEM INTEGRATION

The final question which I would like to consider is, "how do we integrate micro systems into meaningful and comprehensive management systems?" Phil Kotler has suggested that "the implications of any particular configura-

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[2] Arnold E. Amstutz, Computer Simulation of Competitive Market Behavior (Cambridge, Mass.: M.I.T. Press), 1967

[3] Jay W. Forrester, "Structure and Dynamics of Feedback Systems in Marketing", Paper presented at the Ninth Annual Paul D. Converse Awards Symposium, University of Illinois, April 13, 1967

tion of models for making marketing decisions at different company levels are not obvious without a dynamic simulation of the total system". This comment implies that it is possible to combine micro systems at will. Unfortunately "total system" synthesis can be achieved only if careful consideration has been given to the conceptual and structural compatibility of micro system building blocks.

One cannot integrate discrete micro systems based on incompatible measures or inconsistent levels of aggregation. If micro systems have not been designed to function as parts of an integrated whole, it is impossible for the researcher to combine them in a simulation. It is similarly impossible for management to synthesize a meaningful representation of market conditions or decision alternatives from the outputs of disparate micro systems.

Integrated system design must begin with a macro framework. Individual micro systems must be designed to complement explicit macro system functions. Full attention must be given to interface requirements among micro system elements and between the macro system and management.

Once a common management framework has been specified, substantial effort must be devoted to the explicit definition of major decision and market processes. Measures of response and criteria of evaluation must be established in advance. Procedures to be followed in sensitivity analysis and model validation must insure that consistent standards of accuracy and validity are imposed throughout the system.

Once requirements and criteria have been clearly established, micro system development may proceed within a clearly defined framework of boundaries, measures, and priorities.

Phil Kotler has suggested "ultimately (normative) models will form a model bank that can be tapped independently by the marketing vice president, product managers, regional sales managers, and other executives through convenient consoles through which they can retrieve, analyze, and act on specific data related to their marketing decision responsibilities".

I have emphasized the word independently to indicate concern over at least one kind of independence. I am disturbed by the concept of different managers applying different models to the same problem in the context of an operating system. This is not to say that we have no use for a model bank. Management should be aware of available alternatives and devote substantial resources to the intelligent choice of measures, models, and criteria of evaluation.

The important point is that before management begins to use a system as a basis for planning or decision making, they must agree on specific models incorporating common measures, criteria of evaluation, and concepts of market response. The models thus established will constitute an explicit and unambiguous statement of current executive understanding of marketing and decision processes. It is no more reasonable for the individual executive to have the option to choose his own model of advertising response than to choose his own standard costs.

In the course of system design alternative models will be evaluated. Extensive management time will be devoted to the determination of model validity and applicability. As additional information is acquired previous model decisions may be reconsidered and alternative models adopted. The system will be constantly refined as more accurate or meaningful representations of the market are developed and validated. However, at one point in time there will be a single set of micro system models shared by all

executives. These models representing their best current judgment will constitute an explicit statement of a common understanding of relationships linking management actions to market response.

IV. SUMMARY

During the past few minutes I have commented on three questions raised by the preceding speakers' remarks.

A Focus for Micro System Development

The first question was, "what is the appropriate focus of micro system development?" I have suggested that the focus must be quantification. Explicit quantitative models are the prerequisite of systematic structure. Word pictures are unacceptable simply because they are inexplicit and fail to establish meaningful bases for measurement.

Micro system development begins with testable assertions. Existing decision processes may be examined to establish priorities identifying actionable conditions in the environment. Existing intuitive models may serve as a starting point for system development. However, such models cannot be implemented until they have been tested and validated.

The micro system development process can provide a unique opportunity for manager/researcher interaction. It gives the researcher access to management experience and insights while permitting management to test established concepts and refine existing models.

Structural Attributes of a Micro System

The second question was concerned with structural attributes of a micro system.

In my opinion, micro systems must be designed to achieve specific and limited management objectives. It is not reasonable to attempt to develop generalized micro systems applicable to all functions or markets. Micro

systems representing market response to competitive actions may be linked to the inputs and outputs of other system elements to create closed system structures. However, individual micro systems are normally "open" as opposed to "closed" loop in design.

Micro systems must be designed to reflect the concepts, measures, and criteria of the managers who will use them. Management agreement on market relationships and system functions is therefore a prerequisite of micro system development.

Micro System Integration

The third question concerned the method of integrating micro systems into a total management system structure.

I have argued that micro systems cannot be combined unless they incorporate compatible measures of market processes, common standards of evaluation, and comparable levels of aggregation. The development of integrated systems based on micro system elements begins with a management framework delineating boundaries, priorities, and measurement procedures. This macro structure establishes desired total system functions and identifies interface requirements. After establishing a macro structure we must examine the micro mechanisms of market action and response that link management decisions to market share and profitability.

The computer can aid micro system development by facilitating the organization and analysis of extensive micro data files and the rapid evaluation of alternative model structures. Once micro system elements have been developed, the computer becomes a vehicle for synthesis.

Simulation-based computer systems have provided realistic artificial environments in which managers have examined the implications of historical

and hypothetical marketing programs under various assumed competitive conditions. Such simulations have been used by managers to evaluate the appropriateness of alternative solutions for a wide range of consumer and industrial marketing problems.

I hope these questions and comments will provide useful input to later discussion. I appreciate being given the opportunity to present them.

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